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EDITORIALS

THE BATTLE OF HALITOSIS

TWO groups of medical scientists are in the throes of a furious battle, which, when the smoke clears, should end for all time, speculation concerning that type of halitosis, which follows a feasting on garlic, onions and similar unlily-like lilies.

This is the way that *Science News* reports the conflict to date—and while victory rests, as yet, on neither side, at least some strange results are obvious. For instance there is that alliaceous alliance set up by the advertising forces of a nationally known chlorine antiseptic who have showered onions the country over as clinical material for demonstrating the effectiveness of their product's deodorizing technic.

Every battle must breed some benefit and the quick-witted ballyhoo boys rarely miss an opportunity like this. And as the battling medicos continue their more or less dignified controversy, and Science waits with baited breath, the mouthwash sales are multiplying.

Garlic or onion breath is a local affair, resulting from tiny particles of the odorous vegetables which remain in the mouth, Dr. Howard W. Haggard of Yale University insists in a report to *The Journal of the American Medical Association.* He reaffirms that washing the mouth with a solution containing chlorine will completely banish the offending odor from the breath by chemical neutralization of the odorous substance. Chloramine was first recommended by Dr. Haggard as an anti-onion breath mouthwash, but now he reports finding a dilute Dakin solution even more effective.

The scientific studies which led Dr. Haggard and his associate, Dr. Leon A. Greenburg, to support this view of garlic breath were reported in an earlier issue of the medical association's journal. This

brought a prompt counter-attack by Drs. M. A. Blankenhorn and C. E. Richards of the University of Cincinnati. Garlic breath is systemic, they hold, the odor coming from the lungs via the blood which picks it up in the stomach. Mouthwashes, in their opinion, merely mask the odor. As proof of their view they reported experiments in which patients who were unable to swallow were given garlic extracts directly into their stomachs. Hours afterward impartial observers detected the garlicky smell on the patients' breaths though no garlic had been in their mouths.

Re-entering the fray, Dr. Haggard points out what he considers discrepancies in the Cincinnati experiments. For one thing, the Cincinnati doctors gave their patients extracts from as much as one and one-half pounds of garlic.(!!)

"We are willing, indeed anxious, to concede that anyone eating a pound of garlic at one sitting may have the odor in the blood stream as well as the mouth, but our point was and still is that no one eats a pound of raw garlic," he declared.

"The significant point, however," Dr. Haggard says in his latest discussion of the subject, "is the time elapsing between the ingestion of the garlic and the appearance of the odor. If the smell comes from the blood following digestion, minutes or hours must pass before the breath is tainted. This delay is contrary to common experience in eating onions; the characteristic odor appears immediately. In the experiments of Blankenhorn and Richards, some three hours elapsed, even after massive doses of garlic oil, before the odor was detected on the breath."

Yale seems to be winning, but the war may not be over yet. The Cincinnati forces recently gained an ally who reported that he long ago noted a strong garlic odor on the breath of a baby immediately after its birth. He had noted the same odor on the mother's breath during the confinement. Obviously the odor did not reach the infant's breath from garlic or onion particles in its mouth but presumably from the lungs via the blood which, until birth, was supplied from the mother's body. In reporting this, Dr. William Curry Moloney of Jamaica Plains, N. Y., suggests that it should not be hard to find garlic-eating mothers if the Cincinnati doctors wish to continue their studies.

The joke of the whole involved and involving Lilliputian conflict is that each side is correct as far as it goes. Even a schoolboy knows

or should know that onion or garlic breath is not just from mouth-retained particles, nor just from lung exhalations—but more than frequently from gastric gaseous eructations that blend with the breath and bring this volatile miasma to an otherwise healthy air. In the lingo of the ball field—it is a triple play. And no mouthwash, *per se,* will hide such a three-way horror.

In any event, no matter how the conflict ends, the spoils will go to those inspired and perspired opportunists who ride these wanton, willing waves to the harbor of ready profit.

IVOR GRIFFITH.

Treatment for Burns

The tannic acid treatment of extensive burns is, no doubt, highly effective, but it is difficult or impossible to carry it out in isolated homes.

Under such conditions I have found the following preparation highly efficient:

℞

Naphthalene ..... 3v—20.00 Gm.
Liquid petrolatum ..... O i—500.00 cc.
Heat together and then shake well and add a saturated solution of iodine crystals in chloroform ..... f ℥ii—8.00 cc.

This is applied locally or as a spray.

For treating extensive burns, add 1 ounce (32 Gm.) of petroleum wax (paraffin), melted and mixed with the former preparation by heat, in order to make it more adhesive. Gauze should be soaked in this mixture and applied to the burned areas.

This combination, with or without the wax, as the conditions indicate, is also useful in the treatment of cuts, infections, "athlete's foot," erysipelas, and other skin disorders. When properly put up it should be a clear, purple solution.—*Walter B. Guy, M. D.,* in *J. Med. Pract.,* March, 1936.

THE SALE OF CAUSTIC POISONS

FINES were recently assessed against a number of manufacturers and distributors, including ten druggists and paint dealers, in the District of Columbia, for selling caustic or corrosive materials in containers which did not meet the labeling requirements of the Federal Caustic Poison Act, report officials of the Food and Drug Administration, U. S. Department of Agriculture.

Such common household articles as lye, used in softening water, cleaning out drains and kitchen sinks, or ammonia used in cleaning, are dangerous poisons and by law must be labeled as such. Children can not be expected to read such labels. The products should invariably be stored in a safe place and especially should be kept well out of the reach of children.

Two recent examples of such poisoning have been widely publicized. A small boy in Chicago and another in Washington, D. C., each swallowed lye enough to sear the tissues of the throat and esophagus or gullet, until death by starvation appeared certain because the walls of the passage were healing shut. Both are on the road to recovery as treatment—in one case with a string of small rubber balls; and in the other with a string of small beads—is gradually opening the scarred tissues of the throat as the boys swallow the beads and rubber balls each day. By withdrawing the swallowed objects the physicians are keeping the passages open and are gradually enlarging them as they heal.

Through the efforts of the American Medical Association and other interested persons and organizations, Congress passed the Federal Caustic Poison Act on March 4, 1927, for the purpose of insuring the use of poison labels on the dangerous products and thus putting users on their guard. Enforcement of the Act was assigned to the Food and Drug Administration.

The law applies to the following substances in the percentages noted, or more: Hydrochloric acid, 10 per cent.; sulphuric acid, 10 per cent.; nitric acid, 5 per cent.; carbolic acid, 5 per cent.; oxalic acid, 10 per cent.; any salt of oxalic acid, 10 per cent.; acetic acid, 20 per cent.; hypochlorous acid or its salts, except chlorinated lime to yield available chlorine, 10 per cent.; potassium hydroxide, 10 per cent.; sodium hydroxide (caustic soda and lye), 10 per cent.; silver nitrate, 5 per cent.; and ammonia water, 5 per cent.

There are four distinct markings which must appear conspicuously on the label to meet the specifications of the Act. They are as follows:

1. The word *"Poison"* must be printed in uncondensed Gothic capital letters. These letters must be at least one-third of an inch high if the trade name or any other word on the label contains a letter this large. If there is no letter this large, the *"Poison"* must not be smaller than the largest letter.

2. Directions for treatment of the poisonous substance must be stated on the label. The Food and Drug Administration has published antidotal treatments for each of the 12 caustic or corrosive substances covered by the Act. They are intended primarily to relieve the patient until a physician arrives to administer more through treatment, if necessary.

3. The common name of the caustic or corrosive substance must be printed on the label. This not only is informative for those who use it in the home, but it is of particular value to the physician as he can give immediate medical attention.

4. The label also shall bear the name and place of business of the manufacturer, packer, seller, or distributor.

Legal labeling, officials of the Food and Drug Administration feel, will serve as a caution for parents in storing such poisonous substances out of reach of small children. A small child has little sense of taste and is likely to put into his mouth anything that he can get into his hands.

The cases against the ten druggists and paint dealers in the District of Columbia were based on sales of oxalic acid, acetic acid, and ammonia water, without the labeling required by the law. The cases were first offenses on the part of the defendants, and apparently for this reason, the court, after each had entered a plea of guilty, imposed a nominal fine of $10 in each case. The statute provides for a fine of not more than $200 or imprisonment for not more than 90 days, or both.

Pharmacists everywhere should note that the hazard is high where there is careless dispensing of such products. Irrespective of where the jurisdiction of this law extends, there is a distinct obligation, especially upon the pharmacist, to exercise eternal caution in committing to unknowing and innocent hands substances hazardous to life and comfort.

IVOR GRIFFITH.

ORIGINAL ARTICLE

DOSAGE VARIATION IN FILLED SOFT-GELATIN CAPSULES

By Frank G. Brockman

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THE following article reports an investigation made of the variation in content weight of filled soft-gelatin capsules. Previous surveys of the errors in dosage of medicaments have been made, and of these the most noteworthy is perhaps that of Andrews (1). Andrews has however interested himself in the variation in prescription dispensing, while here the interest lay in the variation in capsules, all products of reliable pharmaceutical houses, purchased on the open market. The results obtained are believed to be of sufficient general interest to warrant the recording at this place.

PROCEDURE: Twenty capsules were chosen for each test. These were taken without selection from the original package as purchased. Each capsule was washed with two rinsings of ether, allowed to dry by evaporation and weighed immediately. The capsule was then cut into halves with a small pair of scissors, and, if the filling was completely soluble in ether, this was carried out under ether. If the filling was not ether soluble (as in the case of ABD capsules for instance), the halves were cleaned by rubbing upon clean paper towels. After removing the major portion of the contents by either of the two methods the halves were completely freed of contents by rinsing twice in clean ether. The capsule shell, dried by evaporation, was then weighed. Weights were recorded to the milligram. Each capsule was carried through the complete operation before another was begun, in order to eliminate weight changes between the two weighings due to the absorption of atmospheric moisture.

Some capsules were found which were too hard to cut with a scissors. These were softened by allowing them to stand over night in a "desiccator" in which the desiccating agent had been replaced by water.

That two rinsings with ether were sufficient to remove the contents so that weighings were reliable to a milligram, was demonstrated by weighing a number of shells so washed and then reweighing after

repeated washings. The weights were reproduceable to less than a milligram.

RESULTS: A typical set of weighings follows (Table I). Included is a calculation of the maximum error as well as the average error.

TABLE I

SANTAL OIL CAPSULES, MANUFACTURER B

Capsule Number	Gross Weight	Capsule Weight	Contents Weight	Deviation from Average
1	0.514	0.213	0.301	+0.018
2	0.650	0.365	0.285	+0.002
3	0.618	0.311	0.307	+0.024
4	0.514	0.237	0.277	—0.006
5	0.660	0.357	0.303	+0.020
6	0.505	0.221	0.284	+0.001
7	0.597	0.319	0.278	—0.005
8	0.571	0.274	0.297	+0.014
9	0.587	0.303	0.284	+0.001
10	0.547	0.296	0.251	—0.032
11	0.607	0.326	0.281	—0.002
12	0.597	0.367	0.230	—0.053
13	0.586	0.279	0.307	+0.024
14	0.584	0.299	0.285	+0.002
15	0.622	0.352	0.270	—0.013
16	0.525	0.273	0.252	—0.031
17	0.594	0.314	0.280	—0.003
18	0.511	0.196	0.315	+0.032
19	0.619	0.319	0.300	+0.017
20	0.600	0.318	0.282	—0.001

Maximum Content: 0.315 gram. Minimum Content: 0.230 gram. Average Content: 0.283 gram. Maximum Deviation: 30.0%. Average Deviation: 5.31%.

Table II is a summary of the results for all the samples. Manufacturers' names are replaced by letters.

Note that no attempt has been made to determine the absolute accuracy of the filling (i. e. the accuracy with which the labelled dose is contained in the capsule). The results refer to relative deviations from the mean. Determinations of the absolute accuracy in many cases would involve biological assay, which in view of its statistical nature could not readily be adapted to this survey. This is especially true of the vitamin containing drugs, of which the dosage is expressed in various vitamin units. It is evident however that the procedure here followed does lead, in a convenient manner, to informative results.

TABLE II

SUMMARY OF RESULTS

Capsule*	Manufacturer	Maximum Weight in grams	Minimum Weight in grams	Average Weight in grams	Maximum Percentage Deviation	Average Percentage Deviation
I	A	0.197	0.196	0.197	0.51	0.18
I	C	0.168	0.166	0.167	1.20	0.24
I	C	0.226	0.224	0.226	0.88	0.11
II	D	0.171	0.168	0.169	1.77	0.30
II	E	0.194	0.106	0.141	62.4	14.1
II	F	0.241	0.212	0.223	13.0	2.00
II	C	0.169	0.165	0.168	2.38	0.42
II	C	0.168	0.165	0.167	1.79	0.36
II	G	0.172	0.167	0.169	2.96	0.74
II	H	0.326	0.204	0.252	48.5	7.66
II	I	0.172	0.167	0.169	2.96	0.74
II	J	0.170	0.167	0.168	1.78	0.39
II	K	0.172	0.169	0.170	1.76	0.41
II	L	0.229	0.135	0.180	52.2	12.5
II	B	0.170	0.166	0.168	2.38	0.51
III	K	0.300	0.296	0.298	1.34	0.45
III	B	0.315	0.230	0.283	30.0	5.31
IV	F	0.209	0.143	0.169	39.1	8.10
IV	C	0.170	0.163	0.167	4.19	0.75
IV	C	0.226	0.224	0.225	0.89	0.18
IV	E	0.187	0.118	0.158	43.7	10.7
V	D	0.435	0.409	0.424	6.14	1.49
V	H	0.411	0.287	0.337	36.8	6.66
V	I	0.334	0.310	0.325	7.38	1.38
V	J	0.268	0.255	0.260	5.00	1.04
V	C	0.252	0.238	0.245	5.72	1.28
V	C	0.328	0.317	0.324	3.39	0.69
V	L	0.446	0.327	0.390	30.5	6.83
V	B	0.473	0.465	0.469	1.71	0.42
VI	M	0.488	0.451	0.466	7.94	2.12
VI	N	0.770	0.486	0.658	43.2	7.18
VI	C	0.616	0.600	0.608	2.63	0.72
VI	C	0.609	0.595	0.602	2.32	0.57
VII	O	0.265	0.172	0.217	42.9	8.96
VII	C	0.289	0.283	0.287	2.09	0.56
VII	C	0.573	0.556	0.565	3.01	0.64
VIII	P	0.355	0.267	0.293	30.0	6.86
VIII	Q	0.651	0.407	0.535	26.9	9.11
VIII	A	0.196	0.191	0.193	2.59	0.52

*I Halibut Liver Oil, Fortified. II Halibut Liver Oil, Plain. III Santal Oil. IV Halibut Liver Oil, Viosterol. V ABD Vitamin Concentrate. VI Apiol-Ergotin. VII Harlem Oil. VIII Manufacturer's Specialty.

Products of Manufacturer C obtained directly from manufacturer. ABD Capsules of Manufacturer B obtained directly from manufacturer. Test of Apiol-Ergotin from Manufacturer N performed with only 19 capsules.

Conclusion

Inspection of the results leads to the following generalizations:

(a) In view of the large number of samples which show maximum errors of less than 5 per cent., it would seem that errors greater than this value are avoidable.

(b) The variation among capsules filled with solid-liquid mixtures (e. g. ABD, Apiol-ergotin) tends to be greater than that among capsules filled with liquids only.

REFERENCE

(1) Andrews: *Jour. A. Ph. A. 22,* 755, 838 (1933); *ibid., 23,* 350, 421, 1003, 1117, 1210 (1934); *ibid., 24,* 477 (1935).

To the memory of Dr. Wherry of Cincinnati, Dr. Martin Fischer pays the following eloquent tribute. Would that it might be as appropriately deserved by every worker in the ever-growing realm of science.

"Because of his being, men know more and think differently. The voluntary adherent of no orthodoxy, life made him slave to her greatest—the truth itself. This he used to whisper to students sitting close, to colleagues, to those who were the intimates among the friends whose number was legion. Out of his smile the despairing drew hope; out of his mind, healing; from his somewhat frail body his associates tapped strength.

"And so of this figure who in life walked so frequently before us into the darkness, we can but say that in death he has preceded us again. We do not cry: Farewell! We lift our arms to call: Hail!"

REPRINTED ARTICLES

HERBS, HERBALS, HERBALISTS*

SOME SKETCHES FROM THE HISTORY OF MEDICAL BOTANY IN THE OLD WORLD

By Dr. Helen Bancroft

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IN the very early days, many thousands of years ago, when man first began to live on this earth of ours, his need for food soon led him to distinguish those plants, or parts of plants, which were good to eat from those which were harmful; and, no doubt, at a very early stage, he also discovered that various plants had valuable tonic or curative properties, when he chewed them, or applied the bruised leaves and stems to his wounds.

The old British herbalist, John Parkinson, who lived between 1567 and 1650, and who was "Apothecary to James the First" and "Botanist to Charles the First," published a "Garden Book" in which he makes this statement: "God, the Creator of Heaven and Earth, at the beginning, when He created Adam, inspired him with the knowledge of all natural things (which successively descended to Noah afterwards, and to his posterity): for as he was able to give names to all the living Creatures according to their severall natures: so no doubt but hee had also the knowledge, both what Herbs and Fruits were fit, eyther for Meate or Medicine, for Use or for Delight."

While we can hardly agree with Parkinson that the first man knew all about herbal remedies from the beginning, there is no doubt that necessity would soon bring about the gradual acquiring of knowledge. Such knowledge would, of course, at first be handed on from generation to generation by word of mouth; and to this day, in India and Ceylon, amongst people of very old civilizations, as well as amongst the Zulus and other, more primitive, African tribes, though many wonderful plant remedies are known to the natives, they are guarded very jealously, and are still handed on from father to son by word of mouth only.

Compared with the whole history of man—covering, probably, a period of some 300,000 years—and of his knowledge of plant medi-

*Reprinted from the *Scientific Monthly*.

cines, actual herbal writings, or "herb-books" are few, and of fairly recent date, though, as we shall see, some were produced by the Greeks, even before the time of Christ.

Amongst the accounts which are given of "healing by herbs," some are true, some are quite likely stories, some are very doubtful, and some are obviously pure imagination. In course of time, a great deal of superstition came to be attached to the use of herbal remedies, and so they fell into considerable disrepute amongst the more scientifically minded people. Scientists are now, however, beginning to investigate the chemical properties of herbs, and to understand why they may be valuable as medicines in certain cases; with the result that, in the last few years, herbal remedies have again come to be more widely used.

There is an old Jewish tradition, according to which herbal medicines were in use and were even committed to writing, in the time of King Solomon, about the tenth century before Christ. One of the thirty-nine books of King Solomon, it is said, concerned medicines, which were supposed to be largely herbal; for that the wise king knew much about plants is indicated in the first Book of Kings, in chapter four: "And he spake of the cedar tree which is in Lebanon, even unto the hyssop that springeth out of the wall." But if King Solomon really did write a "herbal," no trace of it remains; and the Jewish tradition accounts for its loss by supposing that it was destroyed or hidden by King Hezekiah, because he thought that the people were placing too much reliance upon the use of the remedies it recommended. This is an interesting tradition, because one of the earliest definite references in literature to the use of a plant remedy is to the case of King Hezekiah himself, who, in about the year 713 B. C., was cured of a boil by placing a "lump of figs" upon it, at the bidding of the Prophet Isaiah.

But even before King Solomon reigned in Judea, there ruled in ancient Egypt a king, Thothmes the Third; and, in about 1500 B. C., this king sent an expedition to Syria, which brought back with it a number of new and strange plants. Representations of the plants were sculptured on the walls of the temple at Karnak, in Egypt, where they may be seen to this day. The figures, which include recognizable irises and a heather, a seedling arum and a lotus flower, are accompanied by an inscription, to the effect that the king caused them to be thus represented so that the knowledge of them might remain "for ever

and ever." Sir Charles Singer, who is the English authority on the early herbals, calls these sculptures and their inscription a "herbal in stone"; they form the earliest *collection* of plant drawings of which we have any knowledge.

It was amongst the Greeks, however, that the study and use of plants in medical science became an established tradition, which has been handed down through the centuries. It is evident that the ancient Greeks were familiar with the use of herbal medicines at an early date; a well-known story from the Greek mythologies tells how Iapis, a favorite pupil of Apollo, was offered a choice of great skill in the foretelling of events, or in music or archery. Instead of any of these, however, he asked for a knowledge of herbs to cure disease. Armed with this knowledge, and with the help of Venus, he saved the life of Aeneas, when he was wounded by an arrow in battle. The old story says that Iapis used a purple-flowered plant called "dittany," which grew on Mount Iwa in Crete (or Candia); Gerard describes the plant as being "hot and dry of Nature," and he adds, "it is reported likewise that the wilde Goats or Deere in Candy when they be wounded with arrows, do shake them out by eating of this plant, and heale their wounds." Dittany, it should be noted, is a relative of the marjoram which is grown in gardens as a flavoring herb, and to provide honey for bees; while herbalists to this day sometimes use this common marjoram externally for the healing of certain wounds and for easing stiff, "rheumatic-y" joints.

Returning to the ancient Greeks, we find the poet Homer, who lived during the tenth or ninth century before Christ, telling of Aesculapius the god of healing. Aesculapius was the son of Apollo, the sun-god, and Coronis, the dawn-goddess, and he was carefully instructed by his father in the art of healing; the sun was regarded naturally, and rightly, as the restorer of life, and it was therefore natural that the sun-god's son should be endowed with curative powers. We are told that one chief source of Aesculapius' knowledge of healing was observation of the remedies resorted to by suffering animals—"what leaf or berry the lizard or dormouse lay upon its wounded fellow"—and for the purpose of such observation, Aesculapius led the life of a pilgrim and wanderer in wild places for long years.

In course of time, temples were dedicated to Aesculapius, and the priests of the temples were called Aesculapiads—priest-physicians, who devoted their lives to the healing and care of sick people. Temples of

Aesculapius survived in Greece and also in Italy for many years after the beginning of the Christian era. In his book, "Marius the Epicurean," Walter Pater describes such a temple near Pisa, even towards the end of the second century; at this temple, Marius saw the great physician Galen, to whom reference will be made later.

There was, then, in ancient Greece, a considerable traffic in medicinal plants, centered about these temples of Aesculapius. In course of time, however, the root-diggers and drug-sellers who made a regular business of collecting, preparing and selling those plants came to be regarded with some suspicion, because, apparently, they tried to keep their trade select by inventing superstitious stories which made it appear that herb-gathering was a very dangerous occupation. It was said, for instance, that peony fruits should be collected only at night, for if they were gathered in the daytime, and a woodpecker happened to witness the act, the eyes of the collector would be in danger. It was also said that an offering of a honey-cake must be made when *Iris fœtidissima* (the gladdon, or purple iris, sometimes found in English woods and thickets, as well as on the continent of Europe) was rooted up; and that if an eagle came near when the hellebore was being gathered, the collector would die within the year. It is not surprising that people came to regard the herbalists, even in those early times, as rather ridiculous, and to feel a little suspicious of Aesculapius himself. This suspicion is expressed by the writer Lucian (about A. D. 160) in his 'Dialogues of the Gods," where he makes Hercules address Aesculapius as a "wandering quack."

The ancient Greeks, therefore, believed that the gods were the first herbalists and physicians and that the art of healing was taught to man by them. The *real* founders of Greek medicine and the compilers of the Greek herbal-lore, however, were not the priests of Aesculapius, but ordinary people who wandered from place to place and earned their living by healing sick folk wherever they found them; one of the recognized and even famous herbalists of these early days was a woman named Agamēde.

The first Greek physician to work along lines more scientific and less bound up with magic and superstition than the methods of the herbalists was Hippocrates, who lived from 460 to 377 B. C. He used plants very largely as medicines—between three and four hundred are mentioned in what are known as the "Hippocratic writings" —though there is no evidence that he ever wrote an actual herbal; he

probably drew upon lists of plants originally compiled by the Egyptians, for Hippocrates and other Greek physicians derived a great deal of their medical learning from Egyptian priests.

The first Greek herbal of which we have any knowledge was written about 350 B. C., by a brilliant physician called Diokles, who lived in Athens. His herbal, we are told, consisted of a description of certain plants, an account of where each might be found, and a list of its medical uses; unfortunately, this work has been lost, as well as most of the other writings of Diokles.

The next herbal of which we know is attributed to Theophratus, a Greek philosopher who lived from about 372 to 287 B. C. Theophrastus wrote a great deal about plants, and was, as a matter of fact, the first really scientific botanist; the ninth book of his "Enquiry into Plants" is the oldest Greek herbal which has actually come down to us. In it are described about 450 plants, knowledge of which he obtained, either at first hand on his travels, or, in the case of foreign plants, from caravan merchants. There is also a good deal of information in this herbal about the folk-lore of plants. Reference has already been made to some of the superstitious stories which the herb-gatherers invented to discourage people from entering into competition with them in their trade; the writer of this oldest-existing Greek herbal ridiculed many of these superstitions—that, for instance, which demanded the collecting of peony fruits at night only. He seemed, however, to think other superstitions quite reasonable, for he agreed that wild rose fruits and hellebore *should* be gathered "standing to windward."

After the "Theophrastan herbal," several herbal works are known to have been written in the third and second centuries B. C., but they have been partially or entirely lost; in the first century, B. C., however, a very important herbal was produced, namely that of Krateuas, physician to King Mithridates of Pontus. Krateuas not only collected herbs, but he wrote a book on their nature and uses; and later (about 75 B. C.), he produced a second herbal, in which plants were not described in words, but were shown in pictures, and then discussed as to their medical uses. This illustrated herbal of Krateuas was the first of its kind, for the earlier books were without pictures of the plants described; after Krateuas, however, herbals were typically illustrated, so that Krateuas had a very far-reaching influence on the

subsequent form and style of the herbal; Sir Charles Singer, in fact, calls him the "father of plant illustration."

The original drawings of Krateuas are, unfortunately, lost; but copies of them are known from a very beautiful herbal—the "Juliana Anicia" Codex—which was written about A. D. 512 for a wedding gift to the daughter of an emperor of that time. This herbal may still be seen in what used to be the Royal Library at Vienna. One of its flower pictures is the plant *Asarum europæum*,[1] the "asarabacca," which, since it was grown by monks for medicinal purposes, may occasionally be found in English woods as an "escape" from cultivation, though it is very rare; Krateuas recommended the plant for "chronic sciatica and dropsy," and also noted that it might be used in "perfumes and antidotes."

King Mithridates of Pontus, the master of Krateuas, who reigned from 111 to 64 B. C., was also an herbalist; but he was a much less reputable one than his servant, for he specialized in a knowledge of poisonous plants and used his knowledge to rid himself of people who were opposed to him. He greatly feared that he himself would be poisoned by his enemies, so that, in order to protect himself, he prepared a complicated "antidote," which contained thirty-eight different ingredients, and which, he hoped, would give him general immunity to all poisons.

A little over a hundred years later—from A. D. 54 to 68—the herbalist Andromachus of Crete was physician to the Emperor Nero in Rome. He is especially known, because he, like King Mithridates, was a compounder of antidotes, or, as they came to be called after their royal inventor, "mithridates." The mithridate of Andromachus was even more complicated than the original, and it was to be used against every kind of poison, injury or disease. After Andromachus, the idea of the mithridate became popular, and even up to the end of the eighteenth century, it was still the custom in certain European cities to prepare, once a year, publicly and in the presence of magistrates, a "Theriaca Andromachi," an antidote which contained about 140 ingredients. The writer of this article was recently reminded of this custom when walking along a quaint old street in Moulins, a cathedral city in France, for, in a chemist's shop-window, was a large and beautiful blue-and-white earthenware jar, bearing an inscription indicating that it had contained the "Theriaca Andromachi" prepared publicly at Moulins in the year 1627. The word "theriaca" or "the-

riac," it may noted, has given rise, by way of the old French and Middle English "triacle," [2] to the modern version "treacle," meaning "antidote," and occurring, for example, in the English common name of a wild fen-land plant, the "treacle mustard," *Erysimum Cheiranthoides*,[3] the name *Erysimum* is itself derived from two Greek words which indicate that the plant is a remedy against loss of voice.

From the time of Krateuas, many herbals have been produced by writers in Italy, Germany, England, and other European countries; and in the first century A. D., various works appeared upon which many of the later ones were based. The earliest of these first century herbals was perhaps that written by Pamphilos, a Greek physician who practiced in Rome. As, however, he apparently described plants which he had never seen, and included many superstitions in his descriptions, his work was not held in great repute.

The most famous and influential of all herbalists is Dioskurides, who became physician to the Roman army in Asia soon after the middle of the first century. Dioskurides traveled widely and was greatly interested in the plants he found, though his interest was mainly "practical," for his actual descriptions of plants were short, compared with the lists of their medical uses. His herbal was, of course, written in Greek; and in compiling it, Dioskurides undoubtedly used the works of previous writers—Hippocrates, Theophrastus, Krateuas, Pamphilos and others. Descriptions of about 500 plants were given; many of these plants were employed as drugs even in the days of Hippocrates, and are still in use—aniseed, belladonna, camomile, linseed and peppermint, for example.

The mandrake is a plant around which some very curious superstitions arose, so that it became one of the most frequently illustrated plants of the herbals. There was, in the early days, a very general idea that the mandrake had human limbs, because the forking of the roots sometimes suggested a likeness to the human body. William Turner, an English physician who lived in the sixteenth century, wrote a famous herbal in which he tells, with great scorn, how "crafty theves," in order to "mocke the poore people," cut and trimmed mandrake roots to make them look like "little puppettes"; in this way, the idea of the human form of the mandrake was spread and encouraged. According to Theophrastus, mandrake leaves mixed with meal were good for wounds, and the roots, treated with wine or vinegar, for many complaints, including sleeplessness. The mandrake's sleep-

inducing properties are illustrated by Lucius Apuleius in his famous story, "The Golden Asse"; he tells of a boy, who, having drunk a strong draught of mandrake in wine, fell down in such a deep sleep that his schoolmaster and his mother, and the servants of the household, in ignorance of what he had drunk, thought he was dead; and he was accordingly buried.

The directions given in the old herbals for the uprooting of the mandrake are very careful and minute, because it was supposed to be a plant of such great virtue. The plant was to be "earnestly delved" around with an *ivory* staff, until its hands and feet" were uncovered; then a hungry dog was to be tethered to the root, and a piece of meat put just out of the dog's reach, so that in straining for the meat, he necessarily jerked up the root. It was popularly believed that whoever uprooted a mandrake would die as a result, and so a dog was sacrificed for this purpose; it will be noted that the dog is tethered to Discovery's mandrake in Fig. 4, and he is also shown in Fig. 5, an illustration from an early printed herbal, produced in Rome about 1484.

It must be remembered that the mandrake of the old herbals—and of the Bible also, for it is mentioned both in Genesis and in Canticles [4]—is not the same as the plant which is sometimes called mandrake in America, and which grows wild in large quantities in the woodlands east of the Mississippi River. This plant is more commonly called "May-apple," and it is a relative of the barberry frequently cultivated in shrubberies; it is widely used in modern medicine as a stimulant for the liver and for dyspepsia; whereas the original mandrake is a member of the potato family, and is not now used medicinally.

The Dioskuridean herbal has been the main source from which later works of the same kind have been derived. Many versions were written in Greek—the "Juliana Anicia" manuscript, containing copies of the drawings of Krateuas, is one of the most famous of these. In the sixth century, Latin versions appeared; and one of these, in about A. D. 1000, gave rise (combined with another herbal to which reference will be made later) to an Anglo-Saxon herbal. The work of Dioskurides thus became widely known in Europe; and it also, through translations into Arabic, Syriac, Persian and Hebrew, came to be used in Oriental countries as well.

It has already been noted that "Marius the Epicurean" saw the physician Galen at the temple of Aesculapius, near Pisa; it is now necessary to discover something of this great man and his work. Galen was born in A. D. 130 at Pergamum in Asia Minor; he studied at the medical school in his native city, and later at Alexandria. When he was twenty-eight, he had a serious illness, caused, apparently, by eating too much fruit; he himself tells us that he owed his recovery to the god Aesculapius, whose grateful servant he henceforth became—that, of course, explains why Marius saw him at an Aesculapian temple. In A. D. 161, Galen went to Rome, where he soon made a name for himself and developed so large a private practice that other physicians were jealous of him, and he nad to leave Rome for a while; when he returned, he settled down to the writing of books on many subjects—he is said to have been the author of nearly 400 works. One of these was an herbal so systematic and complete that for many years no entirely new herbal appeared; indeed, with Galen, Greek medical science may be said to have come to an end.

Galen's Greek herbal, like that of Dioskurides, was translated into Latin. Besides these "derived" Latin herbals, there were one or two "native" works, of which that of Pliny is the best known. Pliny was a contemporary of Dioskurides, and about A. D. 60, he produced an extensive Latin work on natural history, including a lengthy account of "Remedies derived from the Garden Plants." Pliny apparently collected, from all sorts of sources, ideas on the nature, origin and uses of plants. So industriously did he work at his collecting and compiling from other people's books that he considered even taking a walk to be waste of time; but his writings were so uncritical and unscientific that they were of no real value. They were, however, widely read, copied and translated for centuries, with the result that a large part of them has gradually passed into folk-lore, and the gipsy fortune-teller of today, as Sir Charles Singer notes, is still reciting charms and spells that Pliny himself borrowed from the works of the old Greeks, written centuries before his time.

The most important Latin herbal is that of Apuleius. It is not known who Apuleius was; he was certainly not the Lucius Apuleius who wrote "The Golden Asse," for that author lived about the same time as Galen, in the second century A. D., and the Apuleian herbal did not appear until the fourth century. The original has been lost, but numbers of later versions—which are illustrated—are still in

existence. Associated with a Latin version of the Dioskuridean herbal, the Apuleian herbal was first translated into Anglo-Saxon about A. D. 1000, and later about 1120. This later translation was written at the Abbey of Bury St. Edmunds by one of the monks; and it is of great interest, because some of its flower pictures are very natural and of considerable beauty, and were evidently painted by a lover of plants. This Bury St. Edmunds herbal is still in existence, and may be seen in the Bodleian Library, at Oxford.

Versions of the Apuleian herbal were copied and recopied continually; and, when printing was invented, this herbal was one of the first books to be produced in print. Its original illustrations were also reproduced, as wood or metal "cuts," showing the plant as a whole, including its roots, which was, of course, natural in an herbal, for from the herbalist's point of view it was often the root of a plant which had special "virtues." Another feature of these illustrations is that representations of the animal whose bites or stings were supposed to be cured by the use of a particular plant, were often included with the drawing of the plant itself; Fig. 6, for example, shows the plaintain, accompanied by a snake and a scorpion, against the attacks of which it was supposed to be an antidote.

After the invention of printing, many herbals appeared; some were based directly on the old manuscripts, others were translations of manuscripts into French or German, and some, in various languages, were more or less original. The result was that the printed herbal became widespread in Europe—in Germany, France, Italy, the Netherlands, Switzerland and England.

The first printed English herbal was that published in 1525 by "Rycharde Banckes" of London. We do not know who was the real author of this very charming little book; but, whoever he was, he was evidently more poetically than scientifically inclined, as his remarks concerning the herb rosemary indicate. Amongst the many "virtues" of rosemary we find the following:

"Take the flowers thereof and make a powder thereof and binde it to thy right arme in a linnen cloath and it shale make theee light and merrie."

"Boyle the leaves in white wine and washe thy face therewith and thy browes and thou shalt have a faire face."

"Also put the leaves under thy bedde and thou shalt be delivered of all evill dreames."

"Make thee a box of the wood of rosemary and smell to it and it shall preserve thy youth."

The writer of Banckes's herbal evidently drew his information about rosemary from an old manuscript which was sent to Queen Philippa of England (the wife of Edward the Third) by her mother, the Countess of Hainault. This fourteenth century manuscript records an old tradition (not, however, mentioned by Banckes) which is still held by many country people in England today, namely that rosemary "passeth not commonly in highte the highte of Christe whill He was man on Earthe." It is said that the Countess of Hainault not only sent the manuscript to her daughter, but that she sent the first plants of rosemary to England, too. This herb apparently became very costly in the reign of Charles the Second, when it was used, on account of its sweet smell, to ward off infection of the plague, which raged in London in 1665.

Banckes's herbal soon became very popular, and during the next thirty years it was reprinted many times, by different publishers, under different titles.

In 1526, there appeared what is perhaps the most famous of the early printed herbals, namely, "The Grete Herball." This was a translation of a French printed herbal, which was itself most probably derived from a Latin manuscript.

"The Grete Herball" contains a good deal of information which is not strictly herbal; for example, it is pointed out (on the authority of Galen) that bathing is unwise, for "many folke that hath bathed them in colde wa(ter) have dyed or they came home." But this work at least marks a great advance on the methods of the old Greek herbalists and root-diggers, who, it will be remembered, hedged their trade around with secrecy and superstition; for "The Grete Herball" exposes the often-practiced frauds of the herb-sellers—the mandrake superstitution, for instance, is firmly rejected.

Some of the names given to British plants in this herbal are both picturesque and interesting: the common arum is called "prestes hode"; duckweed, "lentylles of the water"; and wood-sorrel, "alleluya." The last two names are of interest, because, as we have seen, "The Grete Herball" was a translation of a French herbal; and duckweed and wood-sorrel are commonly called "lentilles d'eau" and "alleluia," respectively, in France to this day." "Alleluia" is so named because it flowers about Eastertime, when the "Alleluia" reappears in

the church services, after the long Lenten season, during which it is not used.

There were various reprints of "The Grete Herball," but the next new British herbal proper was written by William Turner, between 1551 and 1568. Turner was a clergyman of the "reformed" faith, but he was continually getting into trouble with both parties in the church, and periodically he had to leave England in consequence. He traveled a good deal in Europe, and took a medical degree in Italy, where he also studied botany. He wrote several smaller botanical works before his herbal; it was in the latter that he treated the mandrake story with scorn, as already mentioned.

Then in 1597 appeared John Gerard's "Herball or Generall Historie of Plantes," a book which has made Gerard's name famous, though he does not in the least deserve his reputation, for he merely adopted and completed another writer's unfinished translation of a continental herbal. "Gerard's Herbal" is illustrated by a large number of pictures, most of them borrowed; but one of his own original illustrations is the first published representation of the potato plant. One of the borrowed pictures is an absurd and amusing one of the "Goose Tree," or "Barnakle Tree." Gerard was certainly not a reliable observer, for he declared that he had actually seen a goose tree on a "Small Ilande in Lancashire." His description of it is very circumstantial; he says that branches of old and rotten trees and broken pieces of ships produced whitish shells, inside each of which, in course of time, a bird was formed. When the birds were perfectly shaped, the shells opened and the birds fell out into the sea. The myth of the "Barnakle Tree" was apparently widespread, and was believed at least as long ago as the twelfth century; the "barnacle geese," indeed, caused the church authorities considerable difficulty, because there was doubt whether they were fish, or flesh, or neither, and whether they might, or might not, be eaten during Lent.

Gerard had a herb-garden containing 1000 different herbs, in what is now Fetter Lane, in London. He was undoubtedly a lover of his garden flowers, and of wild flowers also, for one of the most interesting features of his herbal is his account of the plants which he found in the lanes and fields and hedges of "Piccadilla," and other places now overrun by the busy city of London.

John Parkinson, who believed that Adam was inspired with a knowledge of the uses of all herbs, was the next British herbalist after

Gerard; he also had a famous herb-garden in what is now a very busy area in London.

Some of the superstitions which became attached to various herbs have already been mentioned. We must now examine some very absurd ideas about plants which were held even as late as the sixteenth and seventeenth centuries, and which were very popular—one writer, indeed, defended them on the ground that they were "pleasant," even if untrue. These ideas may be considered under two headings—"astrological botany" and "the doctrine of signatures."

Astrological Botany

In Babylon, as long ago as 3000 years before the birth of Christ, men came to believe that they, and all other animals, and all plants and minerals were under the influence of the planets. Each plant was held to be governed by some particular star, which caused the seedling to push out of the ground when the seed germinated. A belief in the influence of the moon upon plants is shown in Pliny's "Natural History" (written about A. D. 60), where we read that the Druids in Britain gathered the mistletoe for medical purposes when the moon was six days old. In most cases it is impossible to discover why an herb was associated with one planet rather than with another; but in some cases, the shapes of the leaves or fruits suggested an association—with the moon, for example, as in the case of the fern "moonwort." In the seventeenth century a belief in astrological botany was very widespread in England, the great advocate of the subject being Nicholas Culpeper, who lived between 1616 and 1654, Culpeper was a "physician-astrologer," not at all popular with the more orthodox members of the medical profession—which is not surprising, for he called them "a company of proud, insulting, domineering Doctors"; he also claimed that his methods were far superior to those of previous astrological herbalists, being guided by reason, whereas their writings were "as full of nonsense and contradiction as an Egg is ful of meat." He wrote a book called the "Physicall Directory," which was reprinted many times; the 1653 edition was described as a discourse showing how "a man may preserve his Body in Health; or Cure himself, being Sick, for three pence Charge, with such things only as grow in England, they being most fit for English Bodies." In "Rewards and Fairies," Mr. Rudyard Kipling tells a story entitled "A Doctor of Medicine," which gives a delightful idea of the "very simple soul"

combined with "a high courage tempered with sound and stubborn conceit" which Culpeper must have been. He met with much criticism, particularly from one William Cole, who wrote very scathingly of him soon after his death. Cole's arguments against astrological botany were very ingenious; he contended that since plants were created on the third day, and the sun, moon and stars on the fourth day, there can be no dependence of plants upon the planets: "Plants were, even when Planets were not."

The Doctrine of Signatures

This was a mystical idea which was, to a certain extent, combined with astrological botany; according to it, plants were "signed," so to speak, by their form and color and scent, in such a way as to indicate what are their healing properties.

A belief in signatures was indicated in the old botanical writings long before it was definitely stated by Paracelsus, a German alchemist, born in 1493. Paracelsus was the son of a doctor, and he himself became a professor of medicine at Basle, where he publicly burnt the works of Galen and other physicians. He had considerable influence on the study of medicine, for he was an able chemist, and pointed out the need for applying chemistry to medicine. Paracelsus was extremely boastful and violent-tempered, and consequently found it impossible to remain long in any one place; he wandered about from country to country, now prosperous and famous, now poor and disgraced. Robert Browning's poem "Paracelsus" gives a vivid idea of his strange career.

The doctrine of signatures was developed by a Neapolitan scientist and writer named Giambattista Della Porta, in 1588. Porta not only believed that plants were "signed" by their form and growth, color and scent; he also held that plants with short or long lives could be used to shorten or lengthen human lives, and that the plants of a particular area were intended to cure the diseases of the people living there. This last idea is interesting, because it led to the discovery of "salicin," used in the treatment of rheumatic fever; this substance occurs in the bark of the willow, which of course grows by water or in damp places likely to induce rheumatism.

The great English advocate for the doctrine of signatures was William Cole, who, however, as we have already seen, ridiculed the idea of "astrological botany." William Cole was born in 1626, at

Adderbury near Oxford; he died when he was only thirty-six, a few years after writing a rather famous book, "Adam in Eden." In this work, he shows how the "wall-nut" has the "perfect Signature of the Head"; the kernel, for example, "hath the very figure of the Brain, and therefore it is very profitable for the Brain, and resists poysons; For if the Kernel be bruised, and moystened with the quintessence of Wine, and laid upon the Crown of the Head, it comforts the brain and head mightily."

Cole was much puzzled by the fact that many herbs with undoubted medicinal virtues were left "unsigned"; he concluded that some were signed in order to put man in the right way in his search for remedies, and that others were left without signatures to encourage him to research and find out their properties for himself.

Another supporter of the doctrine of signatures in England was Robert Turner, the writer of "The British Physician" (1664), in which is mentioned the Jewish tradition concerning the herbals of King Solomon. Robert Turner, unlike William Cole, was a firm believer in astrological botany.

Conclusion

As Mr. Kipling says, in "Rewards and Fairies,"

> Anything green that grew out of the mould
> Was an excellent herb to our fathers of old.

But—

> Half their remedies cured you dead—
> Most of their teaching was quite untrue—

and there is little wonder that under the influence of mystical ideas like astrological botany and the doctrine of signatures, herbal remedies and the trade of the wandering herbalists, or "green men," as they were called, fell into disrepute.[5]

General public interest in medicinal herbs has, however, been revived within the present century as a result of several factors, one of which was the great war of 1914-18. The growing of drug-yielding herbs, at the outbreak of the war, was largely in the hands of Germany and Austria; and in order to keep up supplies of various drugs, in England more particularly, it was necessary that the plants providing them should be, as far as possible, cultivated and prepared in the country. Various associations for these purposes were therefore

formed, and, in England at least, a useful, and, it is to be hoped, a lasting interest in this medical aspect of wild and garden plants was thus encouraged.

Another factor which perhaps stimulated a good deal of interest in medicinal herbs, more particularly in America, was the appearance of Mrs. Gene Stratton Porter's novel "The Harvester." The Harvester, it will be remembered, was an American herb-cultivator, one of his "crops" being ginseng, the root of which has tonic properties; it has much the same shape as a mandrake root, and indeed there is a Chinese legend of the ginseng plant very similar to the early European story of the mandrake.

The foregoing sketches from the "History of Medical Botany" will indicate how this utilitarian aspect of an interest in plants has passed through the various stages of observation, tradition, guesswork and superstition, and finally emerged as a scientific study. A knowledge of chemistry, as Paracelsus even in his day realized, is essential to the treatment of disease; and exact chemical research has now revealed the valuable curative properties of many herbs and plants, as in the case of the drug "salicin," already mentioned, and also in that, for example, of the volatile oil obtained from the wild carrot and found to be of use in the treatment of asthma. This is an interesting case, for the celebrated John Wesley, in a small treatise entitled "Primitive Physic, or an Easy and Natural Method for Curing Most Diseases" (1769), advised sufferers from asthma to "live a fortnight on boiled Carrots only."

Herbal treatment is, in fact, no longer an empirical matter; being founded, as it now is, on scientific research and observation, there is every likelihood that herbs will be increasingly utilized once more as healers of the physical ills of mankind.

REFERENCES

(1) A relative of the wild ginger, or Canada snakeroot (*Asarum canadense*), of North America.

(2) "Triacle", in the sense of "remedy" or "antidote", is employed by Chaucer in the "Canterbury Tales"; commenting upon the Physician's tale, the Host says:

> But wel I woot, thou doost my herte to erme,
> That I almost have caught a cardiacle.
> By corpus bones! but I have *triacle*
> Or elles a draught of moyste and corny ale,
> Or but I here anon a mery tale,
> Myn herte is lost for pitie of this mayde.

(3) The American common name of this plant is "worm-seed mustard". The term "treacle" is frequently applied in England to the syrupy fluid obtained in refining sugar, *i. e.*, "molasses". In conjunction with brimstone (= powdered sulphur), it forms a nursery medicine, at one time very popular. Readers of Dickens will remember that, in "Nicholas Nickelby", the boys of "Dotheboys Hall" were regularly and frequently dosed with this remedy.

(4) Genesis, xxx, 14; Canticles, vii, 13: inferences as to the aphrodisiac properties of the herb, a belief in which is still held in the East.

(5) It may interest American visitors to England to be reminded that the itinerant herbalists gave their name to various inns up and down the country. "The Green Man" at Ashbourne, near the famous Dove Dale, is a notable example.

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The Research Laboratories of Merck & Co., Inc., announce the synthetic preparation of pure vitamin B_1 in the form of the bromide in August of this year.

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UNUSUAL PRESCRIPTIONS*

By W. A. Woodard, M. P. S.

Pharmacist to the Royal Southern Hospital, Liverpool

TWO articles of this series appeared in 1933, and if any additional explanation, other than that contained in the first article need be given for offering a third, perhaps it might be said that at the present time few papers on extemporaneous pharmacy make their appearance in the pharmaceutical Press. One reason for this is probably the marked changes which have taken place during the last few years in the methods of treating disease. These changes, many of which have resulted in increased benefit to sufferers, have not been without their influence on pharmacy, especially in the sphere of ordinary dispensing. A few pharmacists, however, will agree with the writer, when he suggests that there is still room for investigations into the theory and practice of many methods, new and old, which are in use in the dispensary of the shop or hospital.

The first prescription to be mentioned was:

℞

Tinct. Cinerariæ ..... 2 fl. drachms

This was prescribed as eye drops for a case of cataract. *Cineraria maratima,* Linn., more usually known to botanists nowadays as *Senecio cineraria* D. C., is a perennial; natural order, Compositæ. Although indigenous to the Mediterranean region, it is found as a garden plant in many warm temperate parts of the world often under the name "dusty miller." A statement regarding its use for eye treatment appears in the *United States Dispensatory,* 21st edition, to the effect that: "There is upon the market a proprietary preparation which professes to be the expressed juice of this plant, and is recommended in diseases of the eye, especially as an absorbent of cataracts. We do not know, however, of any sufficient scientific justification for a belief in this improbable property." A similar statement appears in Potter's *Cyclopædia of Botanical Drugs and Preparations,* where it is stated that "one or two drops of the fresh juice dropped into the eye is said to be of use in removing cataract."

Information regarding the medicinal and pharmaceutical properties of the plant seems rather scarce. According to Wehmer (*Die*

*Reprinted *in toto* from *The Pharm. Jour. of London, England.*

Pflanzenstoffe, p. 1252), *Senecio cineraria* contains an alkaloid similar to senecionine, found in *S. vulgaris.* This alkaloid, according to Wiet, is a paralysant of peripheral motor and sensory nerves. Bunch (*Brit. Med. J.,* 1900, ii, 212) found that an alcoholic extract of *S. Jacobœa* is capable of producing a rise of the arterial pressure due to contraction of the arterioles, followed, if the dose has been large enough, by arterial dilatation with a fall of pressure. A. Nelson and Co., Ltd., of Grosvenor Square, London, supply the drug in the form of a maceration tincture preserved with alcohol. Apparently, three or four drops added to an eyebath of water have been found effective, but they point out that the prescriber needs to realize that the drug is by no means a specific.

℞

Mercuric chloride	5 grains
Dilute hydrochloric acid	10 minims
Powdered borax	30 grains
Glycerin	3 fl. drachms
Industrial spirit	4 fl. drachms
Distilled water to	4 fl. ozs.

Prescribed as a scalp lotion, this preparation yielded a yellow to red precipitate of mercuric oxide when the ingredients were mixed indiscriminately. In order to produce a clear lotion, it was found necessary to add five grains of sodium chloride in order to decrease the ionisation of the mercuric chloride, and to mix as follows: The mercuric and sodium chlorides were dissolved in part of the water, and the dilute hydochloric acid added. The borax was dissolved in the glycerin, some more of the water was added to this, and finally the alcohol with sufficient water to produce the required volume.

℞

Yellow oxide of mercury ointment 1 p. c. ..... 2 drachms

This simple prescription was dispensed for a patient with conjunctivitis attending the eye clinic. A week later the patient returned to hospital, complaining that the ointment caused severe irritation. The ointment was found to be in order, and, upon questioning, the patient mentioned that he was taking medicine prescribed by his panel doctor. This proved to be a simple mixture containing a 5-grain dose of potassium iodide in chloroform water. The problem was thus explained, because an ointment of this type applied simultaneously with the in-

ternal administration of mixtures containing iodides or bromides results in a combination of free halogen eliminated by the lachrymal fluid with the oxide of mercury and the production of an irritant salt. The point was explained in a letter to the patient's panel doctor, who discontinued the iodide mixture until the conjunctivitis had cleared.

℞

Tinct. Belladonnæ 5 minims in charcoal biscuit.

This unusual and rather amusing combination was ordered for a young child suffering from intestinal toxæmia with distension. In view of the well-known physical properties of charcoal, the writer was very dubious as to the fate of the belladonna alkaloids. The prescriber, however, seemed satisfied with his prescription, and asked for twelve biscuits, each to contain 5 minims of the tincture. The biscuits used were fairly small and perforated; some difficulty was experienced in avoiding loss of the tincture caused by it gaining access to the perforations. After several experiments, the following method was devised: Three or four small indentations were made with a sharp needle, as far away as possible from the perforations. Using a hypodermic syringe and needle, each biscuit was then impregnated with 5 minims of tincture of belladonna, care being taken to add the tincture slowly. After allowing to stand for a few minutes, the indentations in the biscuits were filled with powdered charcoal, well pressed in.

℞

Menthol	12 grains
Bismuth carbonate	120 grains
Sodium bicarbonate	120 grains
Compound tincture of cardamoms	4 fl. drachms
Peppermint water .....to	8 fl. ozs.

Menthol is troublesome in mixtures, and when dispensed as written in the above prescription it quickly rose to the surface, making it difficult for the patient to obtain an accurate and even dosage. Powdered tragacanth improved matters, but the result was not very elegant because the menthol showed a tendency to adhere to the sides of the bottle. A satisfactory mixture was obtained by using tincture of senega. The menthol was powdered and triturated with 1 drachm of tincture of senega, gradually adding the other powders. The compound tincture of cardamoms was then added, and, finally, peppermint

water to produce the required volume. If desired, tincture of quillaia could be used instead of the senega.

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Cocaine hydrochloride	1 per cent.
Argyrol	2.5 per cent.
Distilled water .....to	1 fl. oz.

Dispensed as written, this prescription resulted in a cloudy liquid and the separation of a greyish precipitate on standing. The precipitation of the colloid is difficult to explain; the incompatibility can hardly be due to the cocaine ion because by substituting for the hydrochloride an equivalent amount of cocaine nitrate the trouble is avoided. An alternative method would have been to substitute for the argyrol a non-proprietary brand of silver vitellin, but, unfortunately, none was in stock. In this case the prescriber's permission was obtained to use cocaine nitrate.

(*Acknowledgments are due to the Board of Management of the Royal Southern Hospital, Liverpool, for permission to publish this article.*)

Oil of Jojoba (pronounced hohobah)

One of nature's oddities, a vegetable oil similar to the sperm oil of the whale, has been discovered by the U. S. Department of Agriculture's Bureau of Chemistry and Soils. This oil comes from the seed of a shrub, called by botanists *Simmondsia Californica,* but better known in its native habitat of lower California, Arizona and Northern Mexico, as the wild hazel nut, sheep nut, or goat nut.

The oil is really a liquid wax, composed of unsaturated acids and alcohols combined into esters.

The Mexicans call the plant jojoba (pronounced hohobah). Frequently dotting the desert fringes of the far Southwest, the grayish-green shrub has long been a favorite browsing plant for sheep as it is an evergreen and therefore valuable for winter grazing.

It is a distant relative of the better-known and thickly-branched boxwood, although it is dioecious—that is, the male and female flowers are borne on separate plants. Only female plants bear the nuts from which the liquid wax comes.

The nut itself is not rare. For centuries it has been relished by the Indian tribes inhabitating the area and even the oil, which had not previously been analyzed, has been used commercially as a hair tonic. The seed is egg-shaped and ridged, and as a rule is about one-half inch long and three-eighths of an inch thick.

"Jojoba oil is unique. This oil, which is not a glyceride, but a liquid wax, constitutes over 50 per cent. of the seed from *Simmondsia Californica.* It is composed almost entirely of esters of a high molecular weight, monoethylenic acids and alcohols.

"The unsaturated acids consist of a mixture of eicosenoic and dicosenoic acids, along with small quantities of palmitolic and oleic acids. The unsaturated alcohols are a mixture of eicosenol and dicosenal and a small quantity of lower-molecular-weight alcohols. This composition indicates that it is similar to the sperm oil of the whale.

"Jojoba oil appears unusually stable. When heated to about 572 degrees Fahrenheit no effects were noticeable other than a loss of color from light yellow to clear water-white. For several months two chemists in the department have used it in the place of sulphuric acid in their melting point apparatus."

Colored Glasses and Their Protection for Light Sensitive Chemicals. Jermstad and Östby, *Norges Apotfor. Tidsskrift* 242 (1935), through *Pharm. Zentralhalle 77,* 619 (1936). A light sensitive solution consisting of 2 per cent. potassium iodide in 4 per cent. sulfuric acid was used. Various colored glasses were placed over portions of this solution and subjected to both direct sunlight and light from a mercury vapor lamp. Following such exposure 50 cc. of each solution was titrated with normal sodium thiosulfate. The liberation of more than 1.5 mg. of iodine was taken as an indication of the unsatisfactory quality of the glass. The authors tested 1 black, 1 red, 4 blue, 4 green, and 36 brown containers. The black and red as well as all the brown stood the test very well. The blue and green glasses seemed to be of different character and did not in every case provide the desired protection. The brown containers proved to be very useful. The original paper presents a tabulation giving the amount of liberated iodine found using each glass.

SCIENTIFIC AND TECHNICAL ABSTRACTS

Compiled by Linwood F. Tice, M. Sc.

A Colorimetric Method for the Detection of Tea Seed Oil in Olive Oil. J. Fitelson, *J. A. O. A. C. 19,* 493 (1936). Commercial tea seed oil is expressed from the seeds of a tea plant (*Thea sasanqua,* Nois) which is grown in China, Assam, and Japan, for its oil-bearing properties. The kernels contain up to 60 per cent. of oil. Practically all the crude tea seed oil used in the United States is imported from China, and is used mainly in the textile and paint industries. Refined tea seed oil can be used as an edible oil; it does not contain any saponin, although its presence has been suspected. Owing to the close resemblance to olive oil in its chemical characteristics, tea seed oil has been used as an adulterant for olive oil. The glyceride and fatty acid components of tea seed oil and olive oil are almost identical, so that the usual chemical analysis does not differentiate these oils. Many color tests have been proposed for the detection of tea seed oil, but all of these methods are unreliable. The color tests based on treatment with nitric acid were tried and found to be of no value. So also was the behavior in ultraviolet light found to be of no indicative value.

Olive and tea seed oils differ mostly in the character of their unsaponifiable matter. The author applied the various sterol color tests to the unsaponifiable matter of olive oil and tea seed oil and modified the Liebermann-Burchard reaction for cholesterol until a specific color reaction was obtained for tea seed oil. In this reaction chloroform, acetic anhydride and sulfuric are added to the unsaponifiable matter of the oil. Tea seed oil produces a deep fluorescent color, green by reflected and brown by transmitted light. Olive oil and the other common edible vegetable oils show a green color. Occasionally, olive oil gives a faint green-brown fluorescence. On addition of anhydrous ethyl ether at this stage, tea seed oil produces an intense red color which slowly fades to a light brown. None of the other oils exhibit this deep red color, although some olive oils show a faint tinge of pink before fading to the final light brown. When it was found that these colors could be obtained directly from the oils as well as from the unsaponifiable matter, after suitable adjustment of the concentrations of the reagents, the test was simplified. No color is produced by the

free fatty acids from these oils. Anhydrous ethyl ether appears to be the only common organic solvent that causes the appearance of the red stage with tea seed oil, and the quantity present in mixtures made with olive oil can be determined approximately by the intensities of the red color produced.

An exhaustive study of many samples of oils proved the reliability of this test. All grades of both olive and tea seed oil were tried.

For the complete details of the method itself reference should be made to the original article.

Intravenous Injections of Suspensions of Charcoal. A. Lumière and S. Sonnery, *C. R. Acad. Sci. Paris 200,* 999 (1935), through *Quart. J. Pharm. & Pharmacol. 9,* 330 (1936). It was originally shown by Conklin in 1923 that intravenous injections of finely divided charcoal have a beneficial effect in animals suffering from infection. Clinical results in human beings were obtained later by Saint Jacques. It has now been shown that when injected in rabbits, suspensions of charcoal (2 per cent. in serum) cause the number of leucocytes to be doubled, but there is no effect on the number of red cells. Presumably the beneficial effect is due to this leucocytosis. The suspensions used contained from 8 to 250 million particles per cubic millimeter; the doses injected were from 0.3 to 0.5 cc. per kg. Curiously enough, there were no symptoms of shock.

The Determination of Cinchophen in the Presence of Salicylic Acid. C. Stainier and J. Massart, *C. R. XII^e Congr. Internat. Pharm.* 1935, 477, through *Quart. J. Pharm. & Pharmacol. 9,* 304 (1936). Five cc. of a solution containing from 5 to 10 per cent. of cinchophen is diluted to 100 cc. with water and 3 cc. of glacial acetic acid or concentrated hydrochloric acid are added, followed by 35 cc. of approximately N/10 solution of iodine. The whole is filtered and the precipitate washed four times with 3 cc. portions of iodine solution and then once with 5 cc. of water. The filtrate and washings contain the salicylic acid. The filter together with the precipitate are shaken with ether until the precipitate has completely dissolved, the ethereal liquid is transferred to a separatory funnel and decolorized with approximately N/10 sodium thiosulfate solution. A volume of petroleum

ether is added equal to the ether present, the aqueous layer is removed, and after filtration through a dry filter the ethereal liquid is evaporated to dryness and the residue of cinchophen weighed as such. For salicylic acid the aqueous filtrate from the first filtration is decolorized with sodium thiosulfate solution, extracted with a mixture of ether and petroleum ether, the ethereal extract evaporated at room temperature, dried in a desiccator and weighed. The mixture of ether and petroleum either is used in both cases as it will not dissolve much water, thus rendering the process of drying much more easy.

Comparison of Methods for the Detection of Gelatin in Dairy Products. C. S. Ferguson and P. A. Racicot, *J. A. O. C. 19,* 476 (1936). Certain soured, cultured, fermented or very old dairy products (including sour cream) with or without rennet and not containing gelatin, become cloudy or give distinct precipitates on the addition of picric acid in the Stokes method now official for the detection of gelatin. In every case, however, the character of these precipitates differs from that of the precipitate which picric acid produces with gelatin. The gelatin precipitate is finer, more dense and more likely to remain in suspension keeping the entire serum cloudy; settles only slowly on standing; and adheres tenaciously to the bottom of the test tube after standing overnight. When present in quantity, it may collect in large sticky lumps which adhere to the test tube on shaking, but it does not flocculate easily when present in smaller amounts. The precipitates caused by rennet or by decomposition products occurring as a result of fermentation, etc., flocculate naturally or, if present in small amounts, on shaking. They do not adhere to the test tube, are easily washed out by a stream of water, settle rapidly (leaving the serum practically clear), and on standing agglutinate either at the bottom of the tube or at the surface of the solution. The precipitate produced from rennet rapidly assumes the red color characteristic of Millon's reaction. In the case of mixtures, the gelatin precipitate will remain in suspension long after the flocculent precipitate has settled and, on standing overnight, there will be found the characteristic sticky deposit on the bottom of the test tube. Various workers have attempted to identify the source of the precipitate by various means, either by removing the interfering substances by the use of an adsorbing agent, or by their removal with trichloracitic acid in the filtrate.

The authors compared all the various methods on known samples containing gelatin and those not containing gelatin with the conclusion that the Stokes method appears to be the most accurate method for the detection of gelatin in all types of dairy products. Differentiation of the various gelatin-picrate precipitates on the above described basis enables one to employ the Stokes method with success.

Earthworms as Test Objects for Determining the Value of Drugs to be Used in Human Intestinal Helminth Infestations, P. D. Lamson and C. B. Ward, *Science 84,* 294 (1936). The irrationality of the use of earthworms as test animals for evaluating the activity of anthelmintics to be used in human intestinal helminth infestation has been demonstrated. The human ascaris is parasitic, living in the human intestine. It possesses no respiratory or circulatory system in any way related to that of an earthworm; it can live under anaerobic conditions, and is covered with a chitinous coat. The earthworm is a free-living species, feeding on substances in the ground. It has no chitinous coat and has a circulatory system with five hearts. A comparative study of the toxicity of 121 different chemical substances on both earthworms and pig ascaris showed correlation of action on the two forms in only 6 per cent. Whereas 67 per cent. of these chemicals killed earthworms in 30 minutes or less only 8 per cent. killed ascaris in that time. The authors propose some new "in vitro" methods of testing which seem to be of value.

Determination of Camphor as 2-4 Dinitrophenylhydrazone in Concentrated and Dilute Tinctures. M. M. Janot and M. Mouton, *J. Pharm. Chim. 128,* 549 (1936), through *Analyst 61,* 490 (1936). A modification of Hampshire and Page's method (*Quart. J. Pharm. 1,* 558 (1934)), is recommended for the determination of natural or synthetic camphors. Two cc. of the camphor tincture are diluted with 13 cc. of 90 per cent. alcohol in a 300 cc. conical flask, and 85 cc. of the reagent (1.25 gm. of 2-4 dinitrophenylhydrazine in a mixture of 10 cc. of water and 10 cc. of concentrated sulfuric acid, made up with water to 100 cc. and filtered) are slowly added. The mixture is heated under a reflux condenser for 4 hours and, after cooling, the liquid is diluted to 200 cc. with 2 per cent. (by volume) sulfuric acid, and left

in the dark for 24 hours. The precipitate is collected and the flask and precipitate washed six times with 10 cc. portions of water after which the precipitate is dried at 80° C. for 1 hour, cooled and weighed. One gram of 2-4 dinitrophenylhydrazone corresponds to 0.458 gm. of camphor. With camphor itself the error was about 1 per cent. The synthetic hydrazone consists of golden yellow needles of m. p. 164° C. and the natural hydrazone of orange needles melting at 174° C. With tincture of camphor the error rarely exceeded 3 per cent. All aldehydic and ketonic bodies present are included by this method, but their presence will be disclosed by the melting point of the hydrazone.

The Effect of Active Soybean on Vitamin A. C. N. Frey, A. S. Schultz and R. F. Light, *J. Ind. & Eng. Chem. 28,* 1254 (1936) Legume seeds, particularly soybeans, improve the crumb color of the loaf of bread when used in suitable proportions. The bleaching action is due to an oxidation of the carotene in the flour. The reaction may be observed by shaking a carotene solution in oil with a weak suspension of ground soybeans in the presence of oxygen; after a few minutes the highly colored carotene solution is decolorized. The acidity should not be greater than pH 5. Heating above 50° C. inactivates the soybean. The authors studied the effect of the decolorization of carotene by ground soybeans on its vitamin A potency. Employing the customary biological method of testing it was found that soybeans completely destroyed the vitamin A in carotene solutions. It was furthermore shown that active soybeans destroy at least 99 per cent. of the vitamin A present in cod liver oil.

Phenylanthranilic Acid as an Oxidation Reduction Indicator. A. Kirssanow and W. Tscherkassow, *Bull. Soc. Chim. 3,* 817 (1936), through *Analyst 61,* 499 (1936). Orthophenylamino-benzoic acid (prepared from o-chlorobenzoic acid and aniline in the presence of copper) is a serviceable oxidation-reduction indicator. The reagent is prepared from 1.07 gm. of the acid dissolved in 20 cc. of 5 per cent. sodium carbonate solution and diluted to one liter, 0.5 cc. being used in a titration. One drop of 0.1 N. dichromate solution gives a pinkish-violet color, which is discharged by ferrous salt. For the titration of ferrous salt the sulfuric acid concentration should be 0.6 N.

SOLID EXTRACTS

By Ivor Griffith, Ph. M., Sc. D.

Aaron may have been the better conjurer of the leading pair of Israel, but Moses was the real thinker. When he banned the eating of porcine parts it was not just as a matter of punitive penance, but in the interest of public health. And the orthodox Jew who today abstains from ham and its porky kin, even though they be labelled pickled salmon, is wiser in orthodoxy than most people know. For as in the days of the great trek to the land of honey—the pig-infesting parasite that carries trichinosis to man is today more prevalent than we realize.

This painful and sometimes fatal disease contracted through the eating of infected pork, is fully ten times as common as has hitherto been supposed.

This rather startling state of affairs in the nation's public health was revealed by Drs. Donald L. Augustine and W. W. Spink, of Harvard Medical School, at a recent symposium on infectious diseases, part of the celebration of Harvard University's third century of life. The figures are based on recent dependable studies of autopsy material in Boston, Minneapolis, and Rochester, N. Y.

Recent studies in his own laboratory have convinced Dr. Augustine that the commonly used diagnostic methods, of looking for the parasitic larvae in blood, spinal fluid, and body wastes, are a waste of time, and that microscopic examination of bits of the patient's muscle is of doubtful value. Far better, he declared, is a serological test which he has devised, using the parasites themselves to prepare an antigen.

And before leaving the sty—here is still another item of parallel interest. According to Science fresh pork needs more cooking than it gets, if San Franciscans are typical of pork eaters in general. The parasite that lives in the muscles of hogs and pigs and causes the serious disease, trichinosis, has been found in the bodies of almost one-fourth of a series of 200 persons on whom post-mortem examinations were performed. Drs. James B. McNaught and Eugene V. Anderson report this discovery in the Journal of the American Medical Association. The records of these 200 persons gave no definite history of trichinosis, yet the disease must have been present in its milder forms. In twenty-five autopsies performed on new-born infants the parasite

was not found, thus supporting previous medical observations that prenatal trichinosis does not occur. The authors of the article state that "It is impossible to detect infected pork by practical methods of meat inspection. Two out of ten specimens of fresh pork sausage purchased in first-class markets in a heavily patronized shopping district in San Francisco contained living Trichinella. Therefore, under the present methods of meat inspection, it is necessary for the consumer to assume the responsibility of preventing trichinosis by either avoiding or thoroughly cooking all fresh pork."

Poor Pop-eye,—what with spinach falling into such bad repute with the scientists, his verdant standby may soon be in the discard.

Spinach, long held to be a needed factor in the diet of growing children, took another scientific setback at the recent meeting of the American Chemical Society. The trouble with spinach, it appears, is that it contains oxalic acid, which may be fine enough as a straw hat cleaner, but has no business in an infant's stomach.

In studies reported by scientists of the Children's Fund of Michigan the calcium retention of one little 5-year old girl was .176 grams a day. When spinach was added to her diet the retention fell to .122 grams a day. In a test period when oxalic acid was added to her diet the calcium retention decreased to .082 grams a day.

Oxalic acid, it appears from the report, combines with calcium in the diet and turns it into a form which the human body cannot use. The relatively high oxalic content of spinach appears to be the cause of the vegetable's action.

Calcium is needed by the growing child for the formation of bones and the teeth.

Primitive peoples instinctively knew the value and need of a diversified diet. Indians of North America drank relatively pure water. At least it was neither chlorinated nor alummed to a clot. Their flour was neither bleached nor chemicallized to an anemic inertia. Neither smoke, nor vitreous panel shut their bodies from the sun. They knew not the vitamins, as we do, by their first names, but they were more familiar with them than we had been until very recently.

By the way, it is time that some one should in public print hail the present renaissance—not of learning—but of eating. For practical nutrition is actually changing, in this land at least, the whole complexion of the nation. The availability of a vast choice of fresh vitamin laden foods in greens and grains and fruit is bound to make for a higher plane of health and vigor.

Indians of North America tasted, and found good for food, over a thousand of the plants on the continent.

No less than 1112 species of plants used in some way as food by Indians are listed in a new publication compiled by a chemist, Elias Yanovsky of the U. S. Bureau of Chemistry and Soils. The list includes ferns, algae, and fungi, and shows that Indian cooks contrived fruit jellies, beverages, soups, breads, and other dishes.

Which proves that Lo—the poor Indian was richer in wisdom than ever the poet imagined.

And continuing our dietary discussion some comfort comes from a recent statement that better kitchen control can keep old age itself away for many a lively year. Evidence for this has been obtained in nutrition studies with rats, made by Dr. Henry C. Sherman, Mitchill professor of chemistry at Columbia University and research associate of the Carnegie Institution of Washington.

The diet which extended the prime of life in rats had an increased proportion of milk, making the diet richer in vitamins A and G, calcium and protein, Dr. Sherman reported in a lecture at the Carnegie Institution.

This diet "expedited growth and development, resulted in a higher level of adult vitality as shown by several criteria, and extended the average length of adult life, or improved the life expectation of the adult."

Extension of the life expectation has heretofore been made for lower age levels by hygienic means which deduced the chances of death by diseases of infancy and childhood. By applying the new knowledge of nutrition, Dr. Sherman believes it is now possible to extend life during "the period of the prime."

Because eminent men usually attain their positions of "fullest opportunity" at an age when only the last third of their years remain to render "fullest service to the world," Dr. Sherman believes that the possibility of extending the prime period of life has greater than biological significance.

According to a medical writer pure nicotine or a strong solution of it will kill almost as promptly as hydrocyanic acid or the cyanides, so that, if a lethal dose is taken, there is little time to apply the physiologic antidote—strychnine—or any of the others (amyl nitrite, ammonia, strong coffee, and other stimulants, as well as artificial heat).

Nicotine is used, in strong solutions, in a number of insecticides, which are sometimes carelessly placed in old bottles (such as whiskey or medicine bottles) bearing other labels. Fatalities arising from the swallowing of such solutions by mistake are not very rare.

The irony of the situation lies in the fact that this deadly poison is available to any would-be Borgia—for it may be purchased, without any record of such purchase, and in a crowd-killing quantity, for only a few cents, in any hardware or florist shop.

"My conclusion is that good writing is a form of good manners. Like good manners it has to be learned, and there are individual differences in aptitude for it. It is best learned in youth, and the way to start is for the writer to shift his attention away from himself and to focus it upon that audience whose comprehension of his thought is his only reason for writing at all."—*Edwin G. Boring.*

BOOK REVIEWS

THE CURIOUS LORE OF DRUGS AND MEDICINES. By Charles H. LaWall, Sc. D., Ph. M., Dean of Pharmacy, Philadelphia College of Pharmacy and Science. Garden City Publishing Co., Garden City, N. Y. $1.75.

This is a popularly priced edition of the now famous "Four Thousand Years of Pharmacy", printed from the original plates of the standard volume and including all illustrations and the bibliography of that volume.

The value of this noteworthy work is so definitely established that the author and publishers are to be complimented for it making available to a larger circle of readers through this less expensive form.

Everyone interested in pharmacy and the related medical sciences should own this book, not merely as a library ornament, but as a book to be read and re-read, and so to gain respect for the history of man's progressive struggle against the afflictions that have beset him, since his very first day "out of Eden."

Written by the outstanding pharmaceutical historian of this continent, it is firstly accurate and all of the time interesting.

IVOR GRIFFITH.

PHARMACOGNOSY. By Edmund N. Gathercoal, Ph. G., Ph. M., Professor of Pharmacognosy, University of Illinois, College of Pharmacy, and Elmer H. Wirth, Ph. C., Ph. D., Assistant Professor of Pharmacognosy, University of Illinois, College of Pharmacy. Lea & Febiger, Philadelphia, Pa., 1936. 852 pages, 372 engravings and a colored plate.

The authors have prepared a new text in Pharmacognosy based on the third edition of *Kraemer's Pharmacognosy,* and conforming to the standards of the eleventh revision of the *U. S. P.* and the 6th edition of the *N. F.* The illustrations are particularly clear, fine and abundant and many of them are new.

The treatment of subject matter is logical, concise and interesting, and the use of smaller type for certain portions in the monographs of official drugs and for the entire monographs of unofficial drugs lends itself to vividness.

Throughout the text, newer information on the chemistry of drugs has been emphasized, and the excellent article on the microscopic evaluation of drugs includes a description of the more common microchemical processes, such as microsublimation, isolation of constituents and identification of constituents.

Effective use is made of tables, such as the ones concerning Cinnamon and the starches. Certain diagrammatic schemes have been included, like the one illustrating the relations among the official products obtained from Pinus palustris.

Among the many excellent monographs may be mentioned those on Poplar Buds and Senega.

The section dealing with animal drugs has been extended to about 50 pages. There are drawings showing the location of the endocrine glands, the elements found in powdered desiccated whole ovary and powdered desiccated whole pituitary.

All in all, the volume is a valuable contribution to the science of Pharmacognosy. Well-balanced and reflecting the modern trend in Pharmacognosy, it will prove indispensable to student, pharmacist, research worker and teacher.

M. S. DUNN.